

PLANTS

Many people think of the desert as vast expanses of sand dunes without many plants. Yet, the desert actually has an impressive diversity of plants. For example, Lake Mead National Recreation Area has over eight hundred different kinds, some of which are found nowhere else in the world.



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Harsh desert conditions, such as high temperatures, scarcity of water, constant winds, and lack of soil nutrients, make it difficult for many plants to exist. Plants have an additional problem in that they cannot retreat or escape from the sun as animals can. They have adapted to these problems in a variety of ways and with amazing success.

Desert plants can be divided according to how they meet the conditions of surviving high temperatures and uncertain precipitation: drought escapers, drought evaders, and drought resisters.

Here Today, Gone Tomorrow

The drought escapers are also known as *ephemerals*. They are abundant and showy *annuals*. These are especially noticeable during the spring wildflower season. Water is not a problem for these plants, as the seeds do not germinate if there has not been adequate rainfall. The seeds lie dormant until specific conditions are met. The seed coats contain a germination inhibitor that dissolves with adequate rainfall and specific temperatures.

Life for these plants is brief. The growing season is short. Taking advantage of the two rainy seasons (summer storms and winter showers), they grow quickly, flower, and produce seeds for a new generation. These lie dormant in soil the rest of the year escaping heat and drought. When the seeds have been produced, the plant withers and dies. The seeds fall to the ground, then are carried by wind, rain, or animals. They may wait years for the right conditions to germinate.

Looks Can Be Deceiving

The drought evaders are *perennial* plants that live for many years. They face high temperatures and drought by maintaining life only. They flower in the spring then shed their leaves when summer temperatures arrive. The plants enter a state of dormancy until conditions improve. These plants may look dead much of the year. The ocotillo is a good example.

Spines Are Fine

The drought resisters include a variety of shrubs and other woody

or fibrous plants. They can take the worst the desert has to offer. *Cacti* store moisture in their spongy stems or root tissues during periods of rain, then use it sparingly during times of drought. Leaves have been reduced to *spines* and the green cortex (stem) functions as the leaves, carrying out the process of *photosynthesis*. Other plants, such as the cat-claw acacia and the mesquite, have deep and widespread root systems to capture all available moisture.

Many drought resisters, such as the creosote bush, have tiny leaves and/or coat their leaves with a waxy, resinous substance to reduce moisture loss. Fine, grey, downy hairs on leaves and stems of plants, such as the brittlebush, reflect the sun's rays. These hairs also function



like the spines on cacti to provide shade. Drought resisters survive throughout the year and grow as conditions allow.

Exotic Aliens

Some plants found in the desert today, such as tamarisk (salt cedar) and tumbleweed (Russian thistle), do not belong there. They were introduced from other countries and are called exotic, alien, or non-native *species*. The tamarisk was planted as a shade tree and to control wind and erosion. It came originally from the Mediterranean area and can tolerate salty soils. It grows well in sandy, moist soils and has invaded riverbanks and natural springs, competing with *native species* for precious water sources.

Activity 1 Join The Club

OBJECTIVE: Identify three common plants of the Mojave Desert. List three adaptations plants have developed in order to survive in the desert.

MATERIALS: Clipboards, map of the United States, paper, pencils, props: canteen, several white shirts, several wide-brimmed hats or sun-visors, suntan lotion.

SUBJECTS: Art, science.

SKILLS: Comparison, drawing, observation, public speaking, small group work.

METHOD:

1. Find an outside area near your school that has several different kinds of desert plants. This could also be done on a field trip to a wild desert area.

2. Discuss with students briefly what a desert is. (A region that is hot, dry, windy, has rocky soils, etc.) Display a map of the United States, and show students where the Mojave Desert is

GLOSSARY

adaptation — special tool for survival, physical or behavioral characteristic that makes an organism more suited to its environment.

annual — a plant which completes its life cycle from seedling to mature plant in a single growing season and then dies.

cactus — a plant with fleshy stems and branches and with scales or spines instead of leaves.

community — the plants, animals, and other living things that live in an area and are dependent upon one another.

ephemeral — lasting a very short time, short-lived.

exotic species — non-native, something that did not exist in the area before humans brought it from another place.

mortar — a bowl-shaped receptacle in which substances are pounded to a powder or paste.

mucilaginous — pertaining to or secreting any of various gummy or gelatinous substances.

native species — a plant or animal that evolved or was transported to the area through natural means.

perennial — a plant which persists in whole or in part from year to year and flowers in more than one year.

photosynthesis — the process by which green plants convert carbon dioxide and water into simple sugar. Chlorophyll and sunlight are essential to the series of complex chemical reactions involved.

species — a genetically and adaptively unique plant or animal able to reproduce itself and to evolve.

spine — a pointed, more or less rigid, deep-seated emergence from a plant. A spine is a modified leaf. A thorn differs in having vascular tissue, like a branch.

wash — the bed of an intermittent stream.

located. Ask them if they live in the desert? What would they need to take if they were going to walk through the desert for a day. This would include light-colored clothing with long sleeves and long pants to protect them from the sun and cacti. Other items would be suntan lotion, sunglasses, water, and lunch. Discuss other ideas the children may have.

We can leave the desert when the day is over. When it's hot we go to our air-conditioned homes. Plants can't leave, so they have developed survival tools. Did you know that plants make their own shade? Plants make their own suntan lotion. Plants can store water and reflect the sun's heat.

3. Divide students into four groups.

Give each group a clipboard, paper, and a pencil. Assign a "secretary" for each group.

4. Distribute one prop (see list of materials) to each group that represents a particular adaptation. Students will search to find members of their "club."

Suntan Lotion Lovers — Many plants limit what moisture they can lose through evaporation by covering their leaves or pads with a waxy coating. This works much the same as suntan lotion in protecting us from "drying out" in the sun. Desert plants also have very small or no leaves (may have spines instead) in order to reduce surfaces exposed to the sun. Give students in this group a bottle of suntan lotion.

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White Shirt Specials — Since light colors work to reflect the sun's rays, some plants "wear" light colors to keep cool and, in doing so, retain more moisture. Many desert plants have white leaves or hairy surfaces that work just as a white shirt to reflect the sun's rays. Give students in this group white shirts to wear.

Make-Your-Own-Shade Club — If a plant can be kept cool, it will lose less water through evaporation. Many plants are able to keep themselves somewhat cooler than the surrounding air temperature by "making their own shade." Spines on *cacti* and leaves on trees create shade for those plants. Large plants are able to shade the ground over their root system, which allows for more moisture to be held within the ground and to be used by the roots. Give children in this group sun-visors or hats to wear.

Canteen Kids — Some plants are able to store large amounts of water in their thick leaves or stems. Members of this group are called succulents. Cacti are a good example of this group. After water is taken up by the roots (which are generally short in order to quickly absorb surface water after a shower), it is then chemically changed by the cactus into a *mucilaginous* substance. It does not evaporate as quickly as the watery sap found in large-leafed plants. This moisture is stored in the stem. Give this group a canteen.

5. Ask the students to search for the next fifteen or twenty minutes. Use clipboards and pencils to record findings. Students can draw a simple sketch of the plant. Each group should try to find at least six members of their "club."

6. Gather the groups together and go on a "tour" to look at the best example from each group. (Have the students choose this plant.) Discuss ways we need that plant — for food, water, medicine,

shelter, oxygen, etc. Also include ways animals need that plant — food, shelter, moisture.

7. Ask students ways they can help protect plants — not littering, not picking, not stepping on or driving over. Consider creating a desert garden on the school grounds. Sometimes desert plants can be obtained from areas that are planned for development with permission from the landowner.

EXTENDING THE EXPERIENCE:

Ask each student to choose a plant that they think is interesting and do a research project to find out more about

it. Topics to research might include ways that plant survives in the desert; what particular *community* it lives in (desert wash, cliff, spring); human uses of it for food, medicine, clothing, etc.; and ways other animals use it. The information on plant uses following this activity can be shared with students. Display pictures of each plant with a description about it on a classroom bulletin board.

Uses Of Plants

Beavertail cactus — The young pads and fruits are still used as a food source. Pads are gathered in the spring when most tender and boiled for twenty minutes. The outer skin with all the spines is removed. Pads are cut into strips and stored in water. Fruits are used to make jam.

Brittlebush — Early Catholic priests burned the dried leaves for incense. Native Americans chewed the gum exuded from the stems and heated the gum to smear it on their bodies to relieve pain.

Creosote bush — Over thirteen different kinds of insects make this bush their home, including several species of grasshoppers and crickets that live only on this plant. Native Americans used the plant to treat a wide range of ailments from rheumatism to wounds and burns. A tea was made from the leaves to cure colds and infections. Lac, the resinous incrustation on the branches, was used by Native Americans to mend pottery and attach arrow points to shafts.

Joshua tree — Birds, lizards, packrats, and other animals use the Joshua tree for food, shelter, and nest-building materials. Native Americans used the smallest roots (red) for patterns in their baskets.

Mesquite — Native Americans used the seed pods as an important food source. The seeds were ground into flour and made into gruel or bread. The trunk was used to make mortars and furniture. The sap was used as a snack, for glue, and as an ointment for wounds.

Mojave yucca — Leaves were pounded in water to release the fiber and worked into cordage for ropes, nets, hats, and shoes. Thousand-year-old sandals made of yucca strands have been found in primitive dwellings. Seeds were ground into flour. Roots were cleaned and pounded into a soup called "amole."

Activity 2

My Favorite Plant

OBJECTIVE: Use creative expression in describing the environment.

MATERIALS: Clipboards, index cards, paper, pencils.

SUBJECTS: Art, language arts, science.

SKILLS: Description, discussion, listening, observation, public speaking, reading, writing.

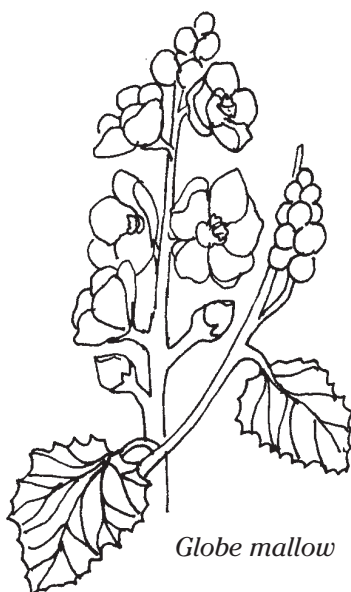
METHOD:

1. Go outside to a desert area and have each student or group of two or three students sit by a plant that they think is interesting. Each student should examine the plant closely, describe it on paper, and think of a name for the plant based on its description. True names are not important. Especially note any unusual characteristics the plant may have. Look also for signs of ways animals use that plant — holes around roots, insects that live on it, etc. Have students look for ways their plant is adapted to the desert. When everyone is finished, have each student or group “introduce” their plant to the rest of the class and tell what they have discovered about it.

2. Have each student or group write a poem about their plant. A simple form to use is this version of a cinquain, a five-lined stanza. On the first line name your plant. On the second line write two descriptive words about it. On the third line write three action words about it. On the fourth line describe its relationship to the environment in four or five words. On the fifth line sum up your feelings about the plant in one word.

EXTENDING THE EXPERIENCE: Do research on each plant to find out its common and scientific names. Are either of these names based on a description of the plant? Have each group write the common and scientific names of their

plant on an index card. On a second card have them write three or four descriptive sentences about their plant. Go back outside and attach the name cards to each plant. Give a description card to each group and have them try to find the matching plant. Switch cards between groups and repeat. These cards could also be used in the classroom to play a game of “concentration.” Spread cards on a flat surface face down. Turn over two at a time to try to match the description with the name.



Globe mallow

Activity 3

Be A Botanist

OBJECTIVE: Identify three common plants of the Mojave Desert.

MATERIALS: Clipboards, crayons, Discovery Activity Page #1, plant field guides, slide projector, slides or pictures of desert plants.

SUBJECTS: Art, language arts, science.

SKILLS: Comparison, drawing, observation, small group work, writing.

METHOD:

1. Find slides or pictures of many of the plants listed in the Fun Facts box. Divide them according to size — belly flowers, below your knees, etc. Share the slides or pictures with your students.

2. Find an outside area near your school that has several kinds of desert plants. This could also be done on a field trip.

3. Split the class into small groups. In addition to each student having a clipboard and copy of the activity page, give each group a plant field guide. Have them look at the field guides, and explain how they can be used to identify plants.

4. Using the activity page (and the field guides, if possible), challenge the students to identify as many plants as they can. Remind them of the size categories as an aid in identification.

5. After getting the group back together, list all the plants found. Did they find plants that are not on the activity page?

6. In what size categories are most desert plants? Compare desert plant sizes with those of a different area, such as a dense forest. Are the sizes different? Why?

EXTENDING THE EXPERIENCE:

Choose plants from the Fun Facts box to list on the board. Have each student pick a plant to draw and describe, similar to what is done in a field guide. Using the size categories in the Fun Facts box, arrange the pictures and descriptions into a plant field guide. Loan your book to other classes to help them identify desert plants near the school.

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Fun Facts — SOME PLANTS OF THE MOJAVE DESERT

Note: Some of the desert plants listed below are in the drawing on the opposite page. Locations are given below.

COMMON NAME

SCIENTIFIC NAME

BELLY FLOWERS

Desert star	<i>Monoptilon belliodes</i>
Desert heron's bill (Filaree)	<i>Erodium texanum</i>
Monkeyflower	<i>Mimulus</i> spp.
Purple mat	<i>Nama demissum</i>

BELOW YOUR KNEES

Chia (bottom row, 3rd from left)	<i>Salvia columbariae</i>
Desert dandelion (bottom row, 5th from left)	<i>Malacothrix californica</i>
Desert five-spot	<i>Eremalche rotundifolia</i>
Desert gold poppy	<i>Eschscholzia glyptosperma</i>
Desert mallow	<i>Sphaeralcea ambigua</i>
Desert paintbrush	<i>Castilleja angustifolia</i>
Forget-me-not	<i>Cryptantha</i> spp.
Gilia	<i>Gilia</i> spp.
Pincushion	<i>Chaenactis</i> spp.
Prickly poppy (Cowboy's fried egg)	<i>Argemone munita</i>
Sun cup	<i>Camissonia brevipes</i>

BELOW YOUR WAIST

Bladderpod	<i>Isomeris arborea</i>
Brittlebush	<i>Encelia farinosa</i>
Burrobush	<i>Ambrosia dumosa</i>
Cheesebush	<i>Hymenoclea salsola</i>
Desert Trumpet (bottom row, 6th from left)	<i>Eriogonum inflatum</i>
Nevada ephedra (Mormon tea)	<i>Ephedra nevadensis</i>
Paper-bag bush	<i>Salazaria mexicana</i>
Rabbitbrush	<i>Chrysothamnus</i> spp.
Sweetbush (Chuckwalla's delight)	<i>Bebbia juncea</i>

COMMON NAME

SCIENTIFIC NAME

OVER YOUR HEAD

Blue palo verde	<i>Cercidium floridum</i>
California fan palm (top row, 2nd from left)	<i>Washingtonia filifera</i>
Catclaw acacia	<i>Acacia greggii</i>
Cottonwood (top row, 1st from left)	<i>Populus fremontii</i>
Creosote bush (top row, 5th from left)	<i>Larrea tridentata</i>
Desert willow	<i>Chilopsis linearis</i>
Joshua tree (top row, 3rd from left)	<i>Yucca brevifolia</i>
Mesquite	<i>Prosopis glandulosa</i>
Mojave yucca (top row, 6th from left)	<i>Yucca schidigera</i>
Ocotillo (top row, 4th from left)	<i>Fouquieria splendens</i>

CACTI

Barrel (bottom row, 2nd from left)	<i>Ferocactus cylindraceus lecontei</i>
Beavertail (bottom row, 4th from left)	<i>Opuntia basilaris</i>
Fish-hook	<i>Mammillaria tetrancistra</i>
Golden cholla (Silver cholla)	<i>Opuntia echinocarpa</i>
Mohave mound	<i>Echinocereus triglochidiatus</i>
Mojave prickly pear	<i>Opuntia phaeacantha</i>
Pencil cholla	<i>Opuntia ramosissima</i>
Teddy-bear cholla (bottom row, 1st from left)	<i>Opuntia bigelovii</i>



How many of these desert plants do you know?

